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ART 34 A EPO

13. A substrate according to claim 12 when dependent on claim 11 wherein the active area on the other side of the substrate is a cathode.
14. A substrate according to any one of claims 1 to 13 wherein there is provided a plurality of semiconductor devices and a plurality of conductive vias for
5 connecting an active area of semiconductor devices on one surface of the substrate to another surface of the substrate.
15. A substrate according to claim 14 wherein the plurality of semiconductor devices are formed as an array.
16. A substrate according to claim 14 or claim 15 wherein there is provided a
10 conductive via for each semiconductor device.
17. A substrate according to any one of claims 14 to 16 wherein the active areas of each semiconductor device are provided on the same side of the substrate.
18. A substrate according to any one of claims 1 to 17 wherein the semiconductor device is a photodiode.
- 15 19. A substrate according to claim 18 wherein the semiconductor device is a photodiode of a medical imaging system.
20. A substrate according to claim 19 wherein the medical imaging system is a computed tomography system.
21. A photo-detector array including a plurality of sub-arrays of photo-detectors,
20 the photo-detectors of each sub-array being formed on a substrate with an active area of each photo-detector being formed on a surface of the substrate, there further being formed for each photo-detector a conductive via through the substrate from an upper surface thereof to a lower surface thereof to connect the active area of each photo-detector to the lower surface of the
25 substrate, wherein a plurality of said sub-arrays of photo-detectors are placed adjacent to each other in a matrix to form the photo-detector array.
22. A photo-detector according to claim 21 wherein the matrix extends in two directions.
23. An imaging system comprising: a radiation detector including a photo detector
30 array according to claim 21 or claim 22, a radiation source facing the radiation

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detector, and means for controlling the radiation detector and the radiation source.

24. An imaging system according to claim 23 wherein the radiation source is an X-ray tube equipped with a high-voltage generator.

5 25. An imaging system according to claim 23 or claim 24 wherein the radiation detector and the radiation source are radially mounted in a cylindrical scanning structure.

26. An imaging system according to any one of claims 23 to 25 wherein the means for controlling comprises a computer system.

10 27. A method of manufacturing a semiconductor device comprising: providing an active area of the semiconductor device on one surface of a substrate; forming a conductive via through the semiconductor device from the one surface of the substrate to another surface of the substrate; and connecting the active area to the conductive via such that the active area is connected to the other
15 surface of the substrate.

28. A method according to claim 27 further comprising the step of electrically isolating the conductive via from the substrate.

29. A method according to claim 27 or claim 28 wherein the conductive via comprises polysilicon.

20 30. A method according to claim 29 further comprising the step of forming polysilicon on the inner walls of the via.

31. A method according to claim 30 further comprising the step of providing a further conductive element from one side of the substrate to the other within the conductive via.

25 32. A method according to claim 30 further comprising the step of providing a filling material within the conductive via.

33. A method according to any one of claims 27 to 32 further comprising the step of providing a further conductive element connected between the active area of the device and the conductive via.

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34. A method according to any one of claims 27 to 33 further comprising the step of providing a further conductive element on the other side of the substrate connected to the conductive via.
- 5 35. A method according to claim 33 wherein the further conductive element is a contact pad.
36. A method according to claim 34 or claim 35 wherein the further conductive element on the other side of the substrate is provided for making an off-chip connection to the conductive via.
- 10 37. A method according to any one of claims 27 to 36 wherein the semiconductor device is a photodiode.
38. A method according to claim 37 wherein the active area on the one surface of the device is an anode.
39. A method according to any one of claims 27 to 38 further comprising the step of providing a further active area on the other side of the substrate.
- 15 40. A method according to claim 39 when dependent on claim 38 wherein the active area on the other side of the substrate is a cathode.
41. A method according to any one of claims 27 to 40 further comprising the step of providing a plurality of semiconductor devices and a plurality of conductive vias for connecting an active area of semiconductor devices on one surface of the substrate to another surface of the substrate.
- 20 42. A method according to claim 41 wherein the plurality of semiconductor devices are formed as an array.
43. A method according to claim 41 or claim 42 wherein there is formed a conductive via for each semiconductor device.
- 25 44. A method according to any one of claims 41 to 43 wherein the active areas of each semiconductor device are formed on the same side of the substrate.
45. A substrate according to any one of claims 27 to 44 wherein the semiconductor device is a photodiode.
- 30 46. A method according to claim 45 wherein the semiconductor device is a photodiode of a medical imaging system.

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47. A method according to claim 46 wherein the medical imaging system is a computed tomography system.
48. A method as substantially described herein with reference to, or as shown in, any one of Figures 2 to 18.
- 5 49. A semiconductor device or substrate substantially as described herein with reference to, or as shown in, any one of Figures 2 to 18.
50. A medical imaging system substantially as described herein with reference to or as shown in any one of Figures 2 to 18.
51. A method as substantially described herein.
- 10 52. A semiconductor device or substrate substantially as described herein.
53. A medical imaging system substantially as described herein.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/FI 03/00575

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H01L31/101 H01L31/0352 H01L23/48

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EP0-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 98 54554 A (HILSUM CYRIL ;SECR DEFENCE (GB); WATTON REX (GB)) 3 December 1998 (1998-12-03) page 3, line 21 - line 29 column 7, line 25 -column 12, line 31; figures 1,2	1-4, 14-17, 27-30, 41-44
Y		5,6,31, 32
X	PATENT ABSTRACTS OF JAPAN vol. 1999, no. 14, 22 December 1999 (1999-12-22) & JP 11 261086 A (SHARP CORP), 24 September 1999 (1999-09-24) abstract	1,27

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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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International Application No
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 599 744 A (MCCAUSLAND CONNIE S ET AL) 4 February 1997 (1997-02-04) column 1, line 18 -column 2, line 32 column 3, line 60 -column 4, line 56 column 7, line 13 - line 40; figure 1 ---	5,6,31, 32
A	US 6 173 031 B1 (KOTIAN FRANCOIS ET AL) 9 January 2001 (2001-01-09) column 1, line 60 -column 2, line 35 column 3, line 37 -column 4, line 27; figures 3,4 ---	1-53
A	US 6 396 898 B1 (SAITO YASUO ET AL) 28 May 2002 (2002-05-28) column 2, line 19 - line 38 -----	1-53

INTERNATIONAL SEARCH REPORT

mation on patent family members

International Application No

PCT/FI 03/00575

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9854554	A	03-12-1998	AU 732258 B2 AU 7439898 A EP 0985137 A1 WO 9854554 A1 JP 2002500763 T US 6388256 B1	12-04-2001 30-12-1998 15-03-2000 03-12-1998 08-01-2002 14-05-2002
JP 11261086	A	24-09-1999	NONE	
US 5599744	A	04-02-1997	CA 2211913 A1 EP 0815591 A2 FI 973239 A JP 11500867 T WO 9630932 A2 US 5717247 A	03-10-1996 07-01-1998 06-08-1997 19-01-1999 03-10-1996 10-02-1998
US 6173031	B1	09-01-2001	DE 19839786 A1 JP 11221207 A	27-05-1999 17-08-1999
US 6396898	B1	28-05-2002	JP 2001242253 A US 2002110216 A1	07-09-2001 15-08-2002